PRECISION RADIATION THERAPY

HexaPOD™ evo RT System; iGUIDE® 2.0

Application Training Guide

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ELEKTA

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Referenced Documents

Not all documents referred to in this document are part of the scope of delivery for the equipment. Medical Intelligence reserves the right to determine which documents are delivered with a product.

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1 Introduction

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1.1 Intended Audience

This document provides a summary of the HexaPOD evo RT System with iGUIDE 2.0 applications training for clinical users.

1.2 Course Description

1.2.1 Duration

The duration of training is two days.

1.2.2 Training Programm

Table 1 Training Program

DAY 1	Day 2
Documentation and system overview Power up/down	Review of day 1 Miscellaneous items
COFFEE BREAK	
Handheld Controller EnableSwitch Board Coordinate systems	Tutorials Practise
LUNCH	
Initialization of the system Routine QA checks	Practise
COFFEE BREAK	
Positioning of patients for treatment Creating and editing patients	Q&A session Checklist and review

1.2.3 Prerequisites

The training course participant must know about the administration of radiation therapy and understand the principles of radiation treatment.

Candidates must have completed this training before this training course:

- Desktop Pro v7.01
- XVI 4.5
- MOSAIQ

1.2.4 Course materials

During this training course you will use the:

- **09-001-1068 HexaPOD evo RT System; iGUIDE 2.0 User Manual**
- **1010070 02 XVI R4.5 Instructions for Use**
- **1015713 01 XVI R4.5 Application Training Guide**

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1.2.5 Course Objectives

After this course you will be able to

- use the HexaPOD evo system safely.
- describe the components of the HexaPOD evo system.
- use the HexaPOD evo system as recommended, and with other software and imaging systems.

1.3 Business Policies

1.3.1 Confidentiality

The information contained in this document is for the sole use of Elekta Limited personnel, authorized users of the equipment, and licensees of Elekta Limited and for no other purpose.

1.3.2 Safety

For the safety of the patients and users, you must always obey all safety procedures. Elekta products have interlock systems, that gives protection to the equipment and the users. Do not remove, change, or override the switches, interlocks, or other safety devices.

1.3.3 Conventions

Names in examples

Example patient names, physician names and hospital names may be used in this manual. Any resemblance to persons and/or organisations is entirely coincidental.

Warnings, cautions and notes

The following are examples of how ***warnings***, ***cautions*** and ***notes*** appear throughout this document. The text within the examples explains their purpose.

WARNING

Warnings are directions. If you do not obey the warnings, you can cause serious injury and/or clinical mistreatment.

CAUTION

Cautions are directions. If you do not obey the cautions, you can cause damage to the equipment, to goods or to the environment.

Note: *Notes provide advice and highlight unusual points.*

1.3.4 Equipment changes

Only Elekta, or a third party with the correct approval from Elekta, must make a change or modification to the equipment. All medical electrical equipment must have regular routine checks and maintenance by a qualified person.

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1.4 About this Guide

This is the Application Training Guide - Clinical for the HexaPOD evo system. This guide includes:

- Course description
- Business policies
- Information about the guide
- Lessons on the correct and safe use of the HexaPOD evo system

1.4.1 Using the guide/module

Do not replace the accompanying documentation for the equipment with the Training Guide. To use only the Training Guide to operate the equipment or do the treatment of patients, can cause fatal injury or clinical mistreatment.

When you operate the equipment or do the treatment of patients, always use the user manuals that we supply with the equipment.

Before you start to operate the equipment or do the treatment of patients, read all the warnings, cautions and safety information in the accompanying documentation.

1.4.2 Glossary

Term	Also referred to as	Description
Alignment Check	—	Verifies that the HexaPOD evo RT System can position the iGUIDE Reference Frame in the room lasers.
ENABLE Buttons	—	Buttons on the Handheld Controller for enabling movements.
EnableSwitch Board	ESB	The control unit in the treatment room; the LEDs provide an overview of the status of the HexaPOD evo RT System. The OPERATE buttons allow you to enable HexaPOD evo RT Couchtop movements from the treatment room.
EXTERNAL INHIBIT LED	—	LED on the EnableSwitch Board that indicates that the HexaPOD evo RT System is preventing the Linac from releasing radiation.
EXTERNAL INHIBIT Signal	—	Used by the HexaPOD evo RT System and other equipment to prevent the Linac from releasing radiation.
Handheld Controller	HHC	The control unit mounted to the HexaPOD evo RT Couchtop.
HexaPOD evo RT Couchtop	robotic couchtop	The HexaPOD evo RT Couchtop can position the patient under the treatment beam with six degrees of freedom.

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Term	Also referred to as	Description
HexaPOD evo RT System	HexaPOD evo system	The complete system for patient positioning: HexaPOD evo RT Couchtop, iGUIDE Tracking System, iGUIDE Reference Frame, iGUIDE software and workstation.
HexaPOD OFF Button	—	Used to switch off the HexaPOD evo RT Couchtop.
HexaPOD ON Button	—	Used to switch on the HexaPOD evo RT Couchtop.
HexaPOD ON LED	—	Indicates that the HexaPOD evo RT Couchtop has been switched on.
iGUIDE Key	—	For enabling/disabling the HexaPOD evo RT System. When disabled, the HexaPOD evo RT System does not set the EXTERNAL INHIBIT signal.
iGUIDE Reference Frame	reference frame	A carbon-fiber frame, equipped with infrared-reflective markers used for calculating the position of the HexaPOD evo RT Couchtop.
iGUIDE Tracking System	camera	Monitors the position of the iGUIDE Reference Frame or iGUIDE Calibration Tool.
iGUIDE Workstation	—	The PC on which the iGUIDE software runs.
LINAC READY LED	—	LED on the EnableSwitch Board that indicates that no equipment is inhibiting HexaPOD evo RT Couchtop movements.
LOAD Button	—	Button on the HexaPOD evo RT Couchtop control panel for requesting a movement to the LOAD position.
LOAD Position	—	The lowest position of the HexaPOD evo RT Couchtop.
MOVEMENT PENDING LED	—	LED on the EnableSwitch Board and Handheld Controller that indicates when a movement command has been sent to the HexaPOD evo RT Couchtop.
OPERATE Button	—	Button on the Handheld Controller for enabling a pending movement.
OPERATE Buttons	—	Buttons on the EnableSwitch Board for enabling movements.
Positional Error	PE	Used to position the treatment site exactly into isocenter. The PE values are provided by the imaging system.
POWER LED	—	Indicates that the HexaPOD evo RT Couchtop is getting power.
Relative Table Movements	RTMs	Used to position the treatment site roughly into isocenter from a known position (for example, markers on the skin).

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Term	Also referred to as	Description
ROT/TRANS Button	—	Switches between rotational and translational modes.
ROT/TRANS LED	—	Indicates if rotational mode is active.
START Position	—	The position in which the HexaPOD evo RT Couchtop has the largest range of movement.
TREATMENT BEAM LED	—	LED on the EnableSwitch Board that indicates when the Linac is radiating.
TREATMENT BEAM Signal	—	The Linac sets this signal to high during radiation. The HexaPOD evo RT System locks the HexaPOD evo RT Couchtop from moving when this signal is active.

1.4.3 Product Documentation

This is a list of the product documents for the HexaPOD evo RT System with iGUIDE 2.0.

- **09-001-1077 HexaPOD evo RT System; iGUIDE 2.0 Planning Guide**
- **09-001-1081 HexaPOD evo RT System; iGUIDE 2.0 Installation Manual**
- **09-001-1078 HexaPOD evo RT System; iGUIDE 2.0 Set-to-Work Manual**
- **09-001-1079 HexaPOD evo RT System; iGUIDE 2.0 Customer Acceptance Test**
- **09-001-1068 HexaPOD evo RT System; iGUIDE 2.0 User Manual**
- **09-001-1074 HexaPOD evo RT System; HexaPOD RT System IEC 62353 Test Documentation**
- **09-001-1080 HexaPOD evo RT System; iGUIDE 2.0 Maintenance Manual**
- **P10105-152 iBEAM evo Couchtop User Manual**
- System Guide for the iGUIDE Tracking System

  i.e. Passive Polaris Spectra User Guide, Northern Digital Inc., Waterloo, Canada (www.ndigital.com)

  Note that not all features described in this manual apply to the HexaPOD evo system. For warnings, cautions, notes and directives regarding the iGUIDE Tracking System, refer to the System Guide for the iGUIDE Tracking System. In the case of differences, the specifications in the present manual are valid.

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2 Overview of the HexaPOD evo RT System

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2.1 About this Lesson

2.1.1 Lesson objectives

After this lesson you will be able to:

- know the components of the HexaPOD evo system.
- know the principal workflow to work and treat with a HexaPOD evo system.
- know the movment ranges of a robotic couchtop and the used coordinate system.
- basically operate the components of the HexaPOD evo system.

2.2 Introduction to the HexaPOD evo RT System

The HexaPOD evo system is a unique fully robotic patient positioning system. It allows the clinical user to remotely correct for misalignments of the patient not only along the traditional translational axes, but also for roll, pitch and yaw (rotational X, Y, Z). The 6 degrees of freedom given by the robotic couchtop allow the user to reposition the patient in any direction.

Figure 1 HexaPOD evo RT System

① iGUIDE Tracking System
② HexaPOD evo RT Couchtop
③ iGUIDE Reference Frame

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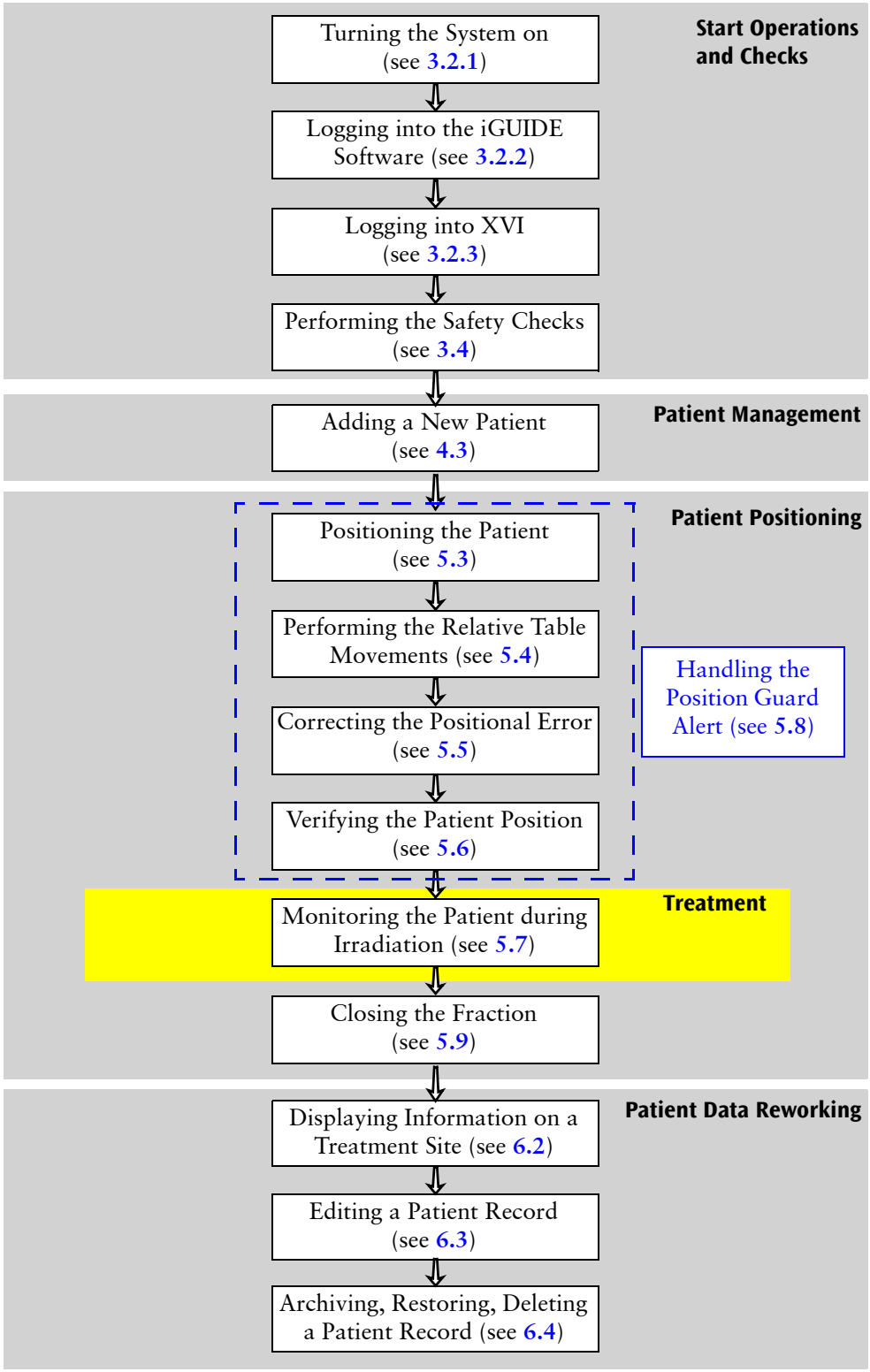
2.3 Principal Workflow


Start Operations and Checks
Turning the System on (see 3.2.1)
Logging into the iGUIDE Software (see 3.2.2)
Logging into XVI (see 3.2.3)
Performing the Safety Checks (see 3.4)
Patient Management
Adding a New Patient (see 4.3)
Patient Positioning
Positioning the Patient (see 5.3)
Performing the Relative Table Movements (see 5.4)
Correcting the Positional Error (see 5.5)
Verifying the Patient Position (see 5.6)
Handling the Position Guard Alert (see 5.8)
Treatment
Monitoring the Patient during Irradiation (see 5.7)
Closing the Fraction (see 5.9)
Patient Data Reworking
Displaying Information on a Treatment Site (see 6.2)
Editing a Patient Record (see 6.3)
Archiving, Restoring, Deleting a Patient Record (see 6.4)

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2.4 Movement Ranges of the HexaPOD evo RT Couchtop

The robotic couchtop has the following translational ranges of movement at the **START** position:

- X axis: ± 30 mm
- Y axis: ± 30 mm
- Z axis: ± 30 mm

The rotational range of movement around all axes at the **START** position is ±3°.

If the robotic couchtop has been translationally moved out of the **START** position by more than 7 mm, it will not have the full rotational range of movement. If it has been rotated, it will not have the full translational range of movement.

For example: If the robotic couchtop has been moved 10 mm in all three directions from the **START** position, the maximum rotation for all three axes will be slightly over 2°. It could be possible to rotate the robotic couchtop 3° around one axis, the range of rotation around the other axes will be further limited.

Display of the axes

The following figure depicts the x, y, and z axes how they are displayed according to the used coordinate system.

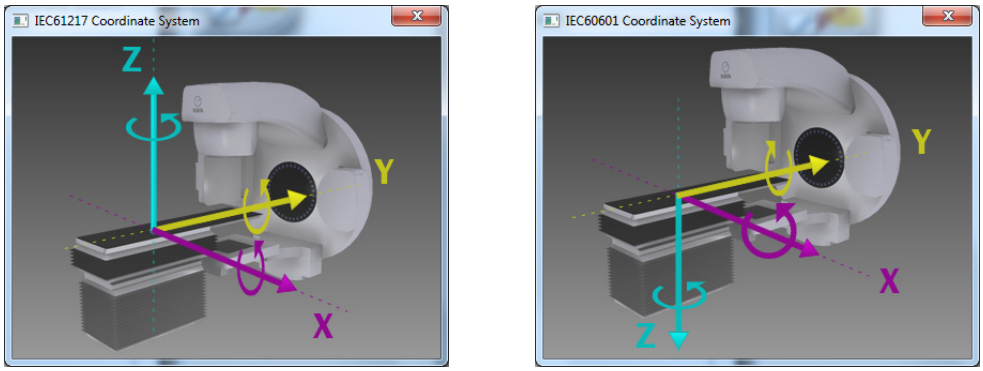

Figure 2 Display of the axes according to the coordinate system

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2.5 Components of the HexaPOD evo RT System

In this section, the main components of the HexaPOD evo system are described.

2.5.1 HexaPOD evo RT Couchtop

The following figure shows the robotic couchtop with the control panel which is drawn to a larger scale on the right side.

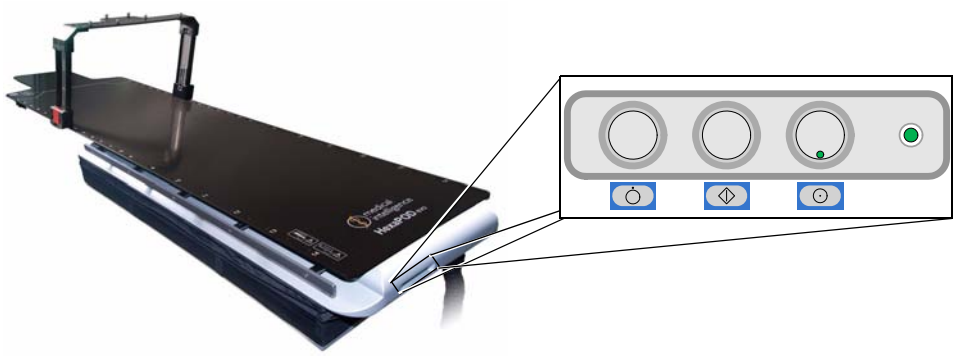
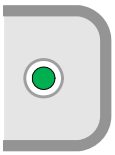
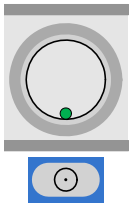
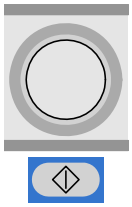
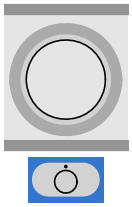


Figure 3 HexaPOD evo RT Couchtop with control panel

Symbol	Description
	**POWER LED** **ON** (green): The robotic couchtop is getting power from the powerbox. **OFF**: No power to robotic couchtop.
	**HexaPOD ON Button, HexaPOD ON LED** The **HexaPOD ON** button is used to switch on the robotic couchtop. The **HexaPOD ON** LED lights up when the robotic couchtop is booting or on.
	**LOAD Button** Press this button with the **ENABLE** buttons on the HHC to move the robotic couchtop to the **LOAD** position.
	**HexaPOD OFF Button** Press and hold this button until the robotic couchtop shuts down (~ 4 seconds).

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2.5.2 Handheld Controller

Use the Handheld Controller (HHC) to position the robotic couchtop manually.

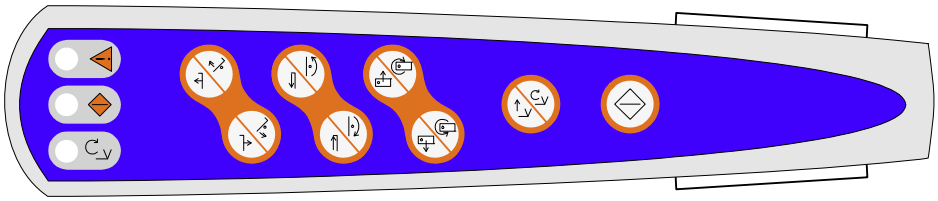
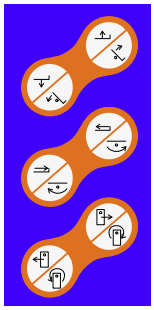


Figure 4 Handheld Controller

The following buttons and LEDs are available on the HHC:

Symbol	Description
	ROT/TRANS LED **ON** (yellow): Rotational movements are activated. **OFF**: Translational movements are activated.
	MOVEMENT PENDING LED **ON** (yellow): A movement has been requested. Press the **OPERATE** button and the **ENABLE** buttons to allow the movement to be executed. **OFF**: No movements pending. The **MOVEMENT PENDING** LED should light up when you press a movement button.
	Not in use.
	**Movement Buttons** The label on each button shows the corresponding movement. Press and hold the **ENABLE** buttons and one of the movement buttons to move the robotic couchtop. The **ROT/TRANS** LED shows if rotations or translations are active.
	ROT/TRANS button Pressing this button toggles between rotations and translations. The **ROT/TRANS** LED shows if rotations or translations are active.

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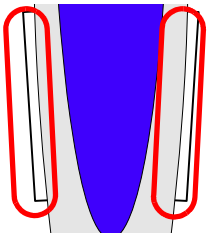
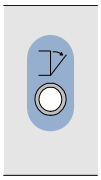
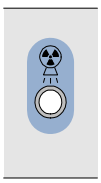
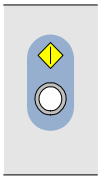
Symbol	Description
	OPERATE Button The **OPERATE** button must be pressed with the **ENABLE** buttons to allow pending movements (indicated by the **MOVEMENT PENDING** LED) to be execute.
	**ENABLE Buttons (2)** These buttons must be pressed (and held) together with either the **OPERATE** button or a movement button to enable movements of the robotic couchtop.

2.5.3 EnableSwitch Board

To enable robotic couchtop movement, **simultaneously** push the two hard-wired **OPERATE** buttons on the ESB. The robotic couchtop immediately stops all movement if one or both buttons are released.

The following buttons and LEDs are available on the ESB:

Figure 5 EnableSwitch Board

Symbol	Description
	**EXTERNAL INHIBIT LED** **ON** (yellow): The HexaPOD evo system has set the **EXTERNAL INHIBIT** signal, which prevents treatment on the Linac. **OFF**: No interlock (treatment possible). Move the **iGUIDE** key to **iGUIDE OFF** to bypass this inhibit.
	LINAC READY LED **ON** (green): The robotic couchtop can move (if the **TREATMENT BEAM** LED is off). **OFF**: No robotic couchtop movement is possible due to safety device inhibits (including the touchguard).
	**TREATMENT BEAM LED** **ON** (yellow): Linac irradiating, no movements of the robotic couchtop possible. **OFF**: No radiation, the robotic couchtop can be moved (if the **LINAC READY** LED is on). *Note*: Watch the **TREATMENT BEAM** LED on the ESB: If the LED is OFF during treatment, put the system out of service and call the technician!
	**MOVEMENT PENDING LED** **ON** (yellow): A movement has been requested and can be enabled. **OFF**: No movements pending. This LED corresponds to the **MOVEMENT PENDING** LED on the HHC.

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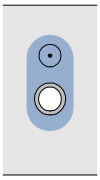
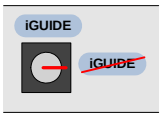
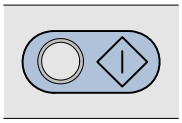
Symbol	Description
	**HexaPOD ON LED** **ON** (green): The robotic couchtop is on. **OFF**: The robotic couchtop is off. This LED corresponds to the **HexaPOD ON** LED on the control panel of the robotic couchtop.
	**iGUIDE Key** **iGUIDE ON** (12 o'clock): The HexaPOD evo system prevents radiation if the patient is not in the final treatment position. **iGUIDE OFF** (3 o'clock): The HexaPOD evo system is off and therefore will not raise any inhibits (e.g. External Inhibit). In the **iGUIDE OFF** position, treatments can be performed without using the HexaPOD evo system.
	**OPERATE Buttons (2)** Both of these buttons must be pressed (and held) to enable movements of the robotic couchtop from the control room.

2.5.4 iGUIDE Tracking System

Power delivery

When the camera receives power, the **POWER** LED will be on. As soon as the camera is at operating temperature, the **Status** LED will be on.

Figure 6 iGUIDE Tracking System

Note: *For positioning with the camera, a warm up period of 30 Minutes must be respected.*

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2.5.5 iGUIDE Reference Frame

The reference frame is installed on the robotic couchtop. The camera finds the accurate patient position tracking the six optical markers on the top side of the reference frame. The optical markers are arranged in a specified geometric pattern.

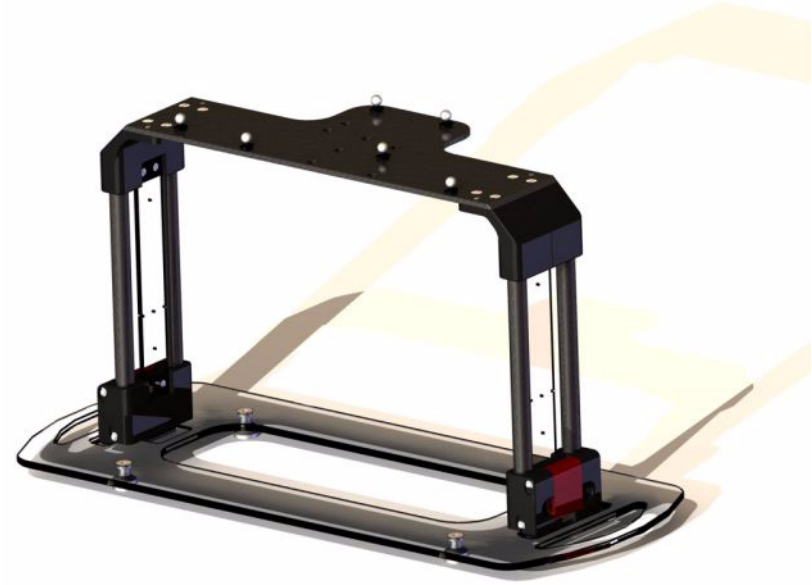

Figure 7 The iGUIDE Reference Frame

Note: *Always handle and store the reference frame carefully in order to maintain the integrity of the reference frame and the arrangement of the optical markers.*

WARNING

- **Always make sure that the reference frame is mounted correctly and the mounting system is firmly locked.**
- **Do not touch, drop or otherwise damage the optical markers.**
- **Do not mount the reference frame so that it is more than 50 cm from isocenter during positioning.**

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3 Starting the HexaPOD evo RT System

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3.2	Starting the Systems and the iGUIDE Software	25
3.3	The System Overview Window	27
3.4	Performing the Safety Checks	29

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3.1 About this Lesson

3.1.1 Lesson objectives

After this lesson you will be able to:

- start the systems and the iGUIDE software.
- perform the safety checks.

3.2 Starting the Systems and the iGUIDE Software

3.2.1 Turning the Systems on

1 Turn the Linac on.

The robotic couchtop is powered by the Linac.

2 Turn the MOSAIQ, the XVI and the iGUIDE PCs on.

3 The following message will appear on XVI:

Intuity™ - XVI - XVI135506
XVI is configured to communicate with iGUIDE. Press Connect on iGUIDE to establish communications with XVI.
OK

Figure 8 XVI communicates with the iGUIDE software

Don't click OK until the iGUIDE software is operating.

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3.2.2 Logging into the iGUIDE Software

1 When you switch on the iGUIDE workstation, the iGUIDE software starts automatically and the login window appears.

2 Switch the **iGUIDE** key to **iGUIDE ON** position.

3 Enter your user name and password.

Figure 9 The login window of the iGUIDE software

4 The HexaPOD evo system will connect to all subsystems (camera, system control interface, reference frame, etc.) automatically.

3.2.3 Logging into XVI

1 Click OK in the XVI message (see **Section 3.2.1 *Turning the Systems on* on page 25**).

2 Enter your user name and password in XVI.

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3.3 The System Overview Window

The **System Overview** window is automatically opened when you have logged in or after one of the subsystems has been disconnected.

Note: *After completing the daily QA, the* **System Overview** *window will not be displayed again, unless a subsysytem has been disconnected.*

The **System Overview** window can be opened by clicking the **Subsystems** button.

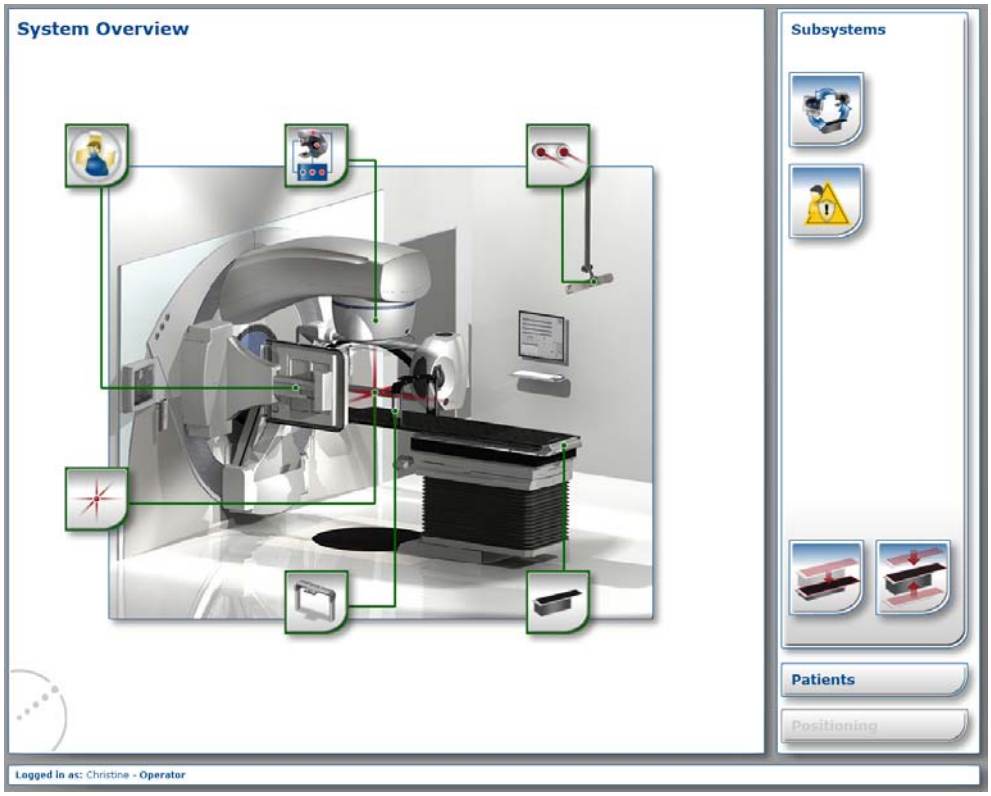

Figure 10 *System Overview window*

Subsystems control buttons

Table 2 *The Subsystems control buttons*

Button	Description
(**Connect to all subsystems**)	Connects all subsystems.
(**Run safety checks**)	Performs all safety checks one after the other.
(**Logout**)	Logs out of the iGUIDE software. Usually, this button is not visible. It is only visible at the iGUIDE software start for a very short time and in the case of connection problems to substitute the key.

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Table 2 The Subsystems control buttons

Button	Description
(**Move HexaPOD to LOAD**)	Moves the robotic couchtop to its lowest position. The **LOAD** position is used to get patients on and off the robotic couchtop.
(**Move HexaPOD to START**)	Moves the robotic couchtop to its **START** position (the position with the optimum movement range). The iGUIDE software will prompt the user to move the robotic couchtop. This should be done prior to patient set up.

Subsystem symbols

Table 3 Main Screen Subsystems

Symbol	Description
	Measuring System(s) Displays the status of the external imaging system (ie. XVI).
	Signal Interface Displays the status of the devices on the signal interfaces. The **Interlock Check** may be started.
	Camera Displays the camera status. The **Correlation Check** may be started.
	Isocenter Manager Displays the isocenter status. The **Alignment Check** may be started. The system may be calibrated by the administrator.
	Reference Frame Displays the serial number of the reference frame.
	HexaPOD Displays the robotic couchtop status. The **HexaPOD Enable Check** and the **Correlation Check** may be started.

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3.4 Performing the Safety Checks

Prior to clinical daily use, the safety checks have to be performed and successfully completed. You can start the safety checks manually as described below.

Note: *Medical Intelligence recommends that you do the Daily QA procedure with the gantry at 180°, to ensure that the camera has a clear view of the reference frame.*

To start the safety checks, click **Run safety checks**. The checks are performed one after the other and cannot be skipped; however, they can be run separately between treatments if required.

The following checks must be performed:

- **HexaPOD Enable Check**
- **Correlation Check**
- **Interlock Check**
- **Alignment Check**

Note: *If one of the safety checks fails it will not be possible to treat patients!*

The check results are displayed in the following dialog box:

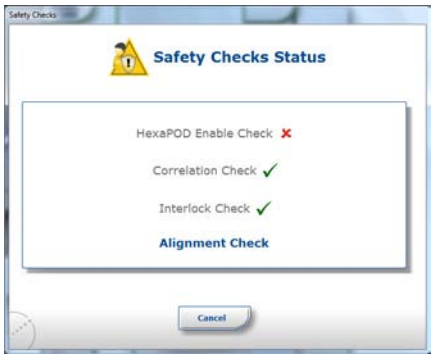

Figure 11 *Safety Checks Status dialog*

The checks are marked as follows:

- A green tick = successfully completed.
- A red x = failed.
- A bold, blue check = currently being performed.
- A blue check = awaiting to be started.

When all checks are completed successfully, the **Cancel** button changes to **Close**. Click it to continue working with the iGUIDE software.

3.4.1 Performing the HexaPOD Enable Check

The **HexaPOD Enable Check** checks the correct operation of the HHC and ESB and no unintentional demands.

3.4.2 Performing the Correlation Check

During the **Correlation Check**, the iGUIDE workstation sends movement commands to the robotic couchtop. The camera verifies that the actual movements correlate to the expected movements.

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Before starting the **Correlation Check**, the iGUIDE software requires that the reference frame is mounted in slot A of the table.

Note: *To avoid collisions and to avoid the gantry obscurring the reference frame, please move the gantry to 180° before starting the Correlation Check.*

3.4.3 Performing the Interlock Check

The **Interlock Check** ensures that the HexaPOD evo system can prevent the Linac from radiating when the patient is not in the correct treatment position, by raising an **EXTERNAL INHIBIT** signal.

Note: *Prior to performing the* **Interlock Check**, *ensure that no* **EXTERNAL INHIBIT** *signal is raised on the Linear Accelerator from another subsystem.*

The iGUIDE software displays the following dialog box two times:

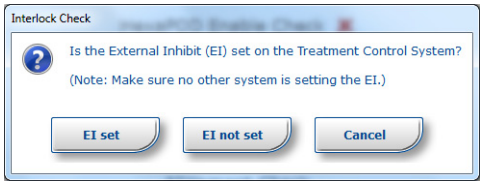
Interlock Check
Is the External Inhibit (EI) set on the Treatment Control System?
(Note: Make sure no other system is setting the EI.)
EI set
EI not set
Cancel

Figure 12 Verify the External Inhibit state

Check the status twice in the **View Restrictions** dialog box at the Linac desktop and click the corresponding button in the **Interlock Check** dialog box each time.

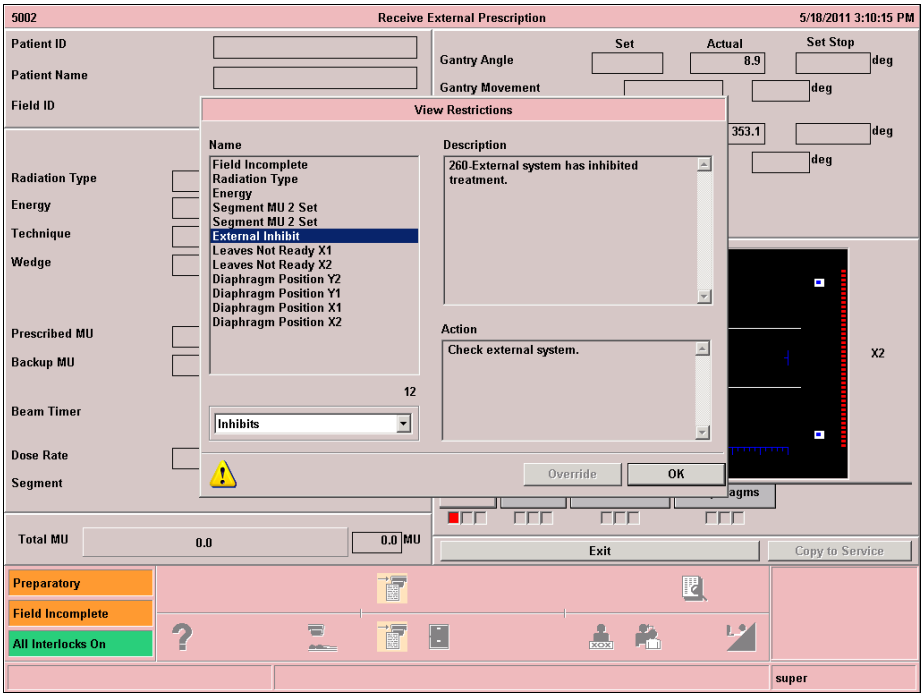

Figure 13 External Inhibit display on the Elekta Desktop software

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3.4.4 Performing the Alignment Check

The **Alignment Check** moves the robotic couchtop so that the reference frame is aligned to the room lasers.

This check requires that

- the treatment room lasers are calibrated,
- the treatment room lasers were not changed since the last iGUIDE software set-to-work procedure and
- the calibration tolerance of the treatment room lasers is < ±0.5 mm.

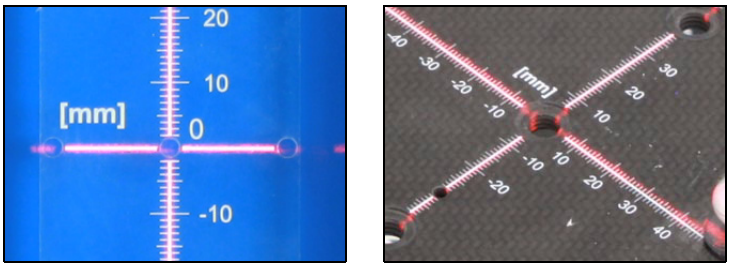

Figure 14 iGUIDE Reference Frame aligned to the room lasers

1 The iGUIDE software displays the following dialog.

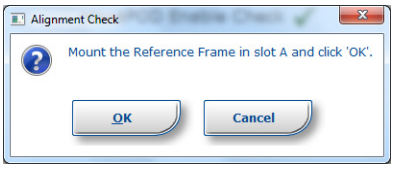

Figure 15 Mount the reference frame for **Alignment Check**

Mount the reference frame and click OK.

2 Prior to completing the **Alignment Check**, it may be necessary to move the Precise Table. The following dialog box appears:

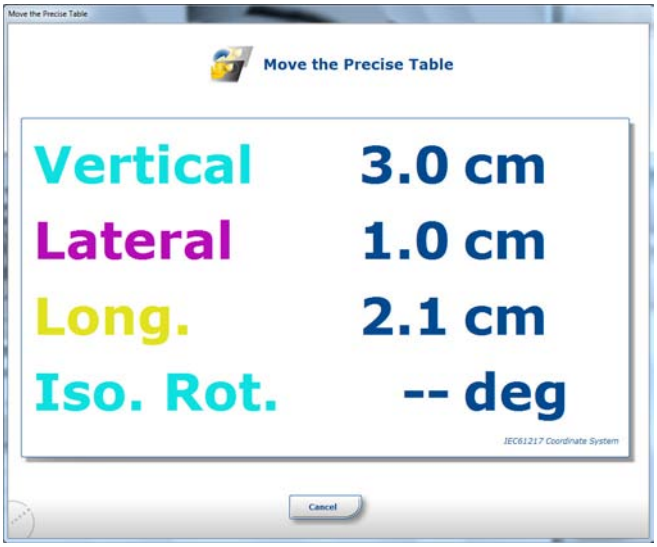

Figure 16 Manual Precise Table moves requested

When the Precise Table has reached the target position, the dialog box will close.

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3 The iGUIDE software sends movement commands to the robotic couchtop.

Move HexaPOD to START
Move HexaPOD to START
Press
Press
Enable the movement until the HexaPOD reaches its destination.
EnableSwitch Board: Press the OPERATE buttons.
Handheld Controller: Press the OPERATE button and ENABLE buttons.
This move brings the HexaPOD to the START position. This move is mandatory after registration. Cancel this move only if you have already scanned the patient but have not yet registered the patient.
Cancel

Figure 17 HexaPOD evo RT Couchtop moves requested

When the robotic couchtop has reached the target position, the dialog box will close.

4 The iGUIDE software prompts you as to whether the reference frame is aligned with the lasers.

Respond to the prompt as follows:

- Click **Yes** if the reference frame is aligned to the lasers.
- Click **No** if the reference frame is not aligned to the lasers.

Troubleshooting

If the check fails, possible reasons may include:

- The room lasers were adjusted.
- The camera was moved.
- The reference frame was not in view of the camera.
- The robotic couchtop was in **LOAD** position.

Check these parameters and repeat the **Alignment Check**.

If the check still fails, call the system administrator or a service engineer.

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4 Managing Patient Data

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4.1 About this Lesson

4.1.1 Lesson objectives

After this lesson you will be able to:

- add a new patient.

4.2 The Patients Window

Patient data terms

The iGUIDE software uses three terms for the definition of patient data:

- **Patient**
  For every patient a patient record is defined with a unique patient ID. The patient record contains all patient data relevant for the treatment.
- **Treatment site**
  A treatment site specifies the area which shall be treated. Several treatment sites may be defined for a patient.
- **Fraction**
  A fraction is the whole session in which a specific treatment site of a patient is positioned and irradiated. For a treatment site several fractions may be performed.

Patients window

You manage patient and treatment data from the **Patients** window.

When the daily QA has been performed the **Patients** window is shown automatically.

You can also open the **Patients** window by clicking the **Patients** button.

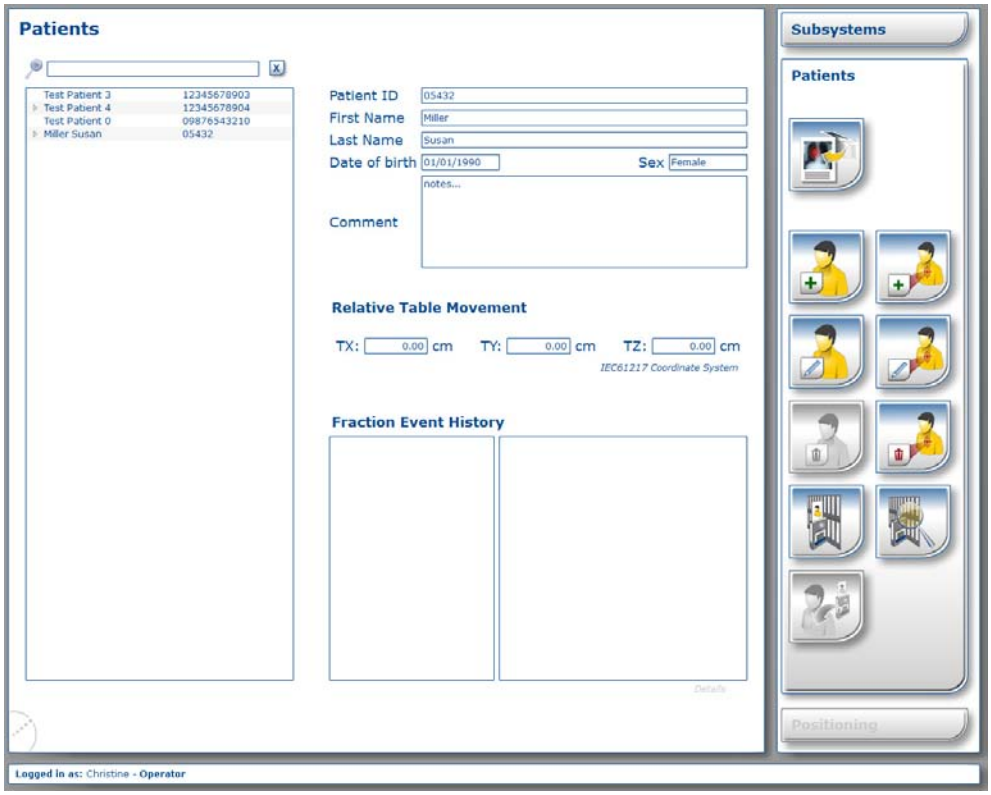

Figure 18 The **Patients** *window*

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On the left-hand side of the **Patients** window, you see the **Patients** list with columns for the **Name of the patient** and the **Patient ID**.

Patient management buttons

Table 4 The patient management buttons

Button	Description
(**Open Fraction for Positioning**)	Opens a fraction for patient positioning. A treatment site must be selected. The **Positioning** window is displayed.
(Add Patient)	Adds a patient record.
(Edit Patient)	Edits a patient record.
(Delete Archived Patient)	Deletes a patient record from the archive.
(**Add Treatment Site**)	Adds a treatment site.
(**Edit Treatment Site**)	Edits a treatment site. Only enabled when a treatment site is selected.
(**Delete Treatment Site**)	Deletes a treatment site. Only enabled when a treatment site is selected.
(Archive patient)	Moves a patient record to the archive. It is recommended that this is done once the treatment cycle of a patient is complete.
(**Open/Close Archive**)	Opens the archive and show all archived patient records or to close the archive.
(Restore Patient)	Restores a patient record from the archive.

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4.3 Adding a New Patient

1 Click the **Add Patient** button.

The **Add Patient** dialog box is opened where you can enter the patient data.

2 Fill in the relevant patient data on the corresponding fields and check boxes:

- **Patient ID**
  The patient ID must be unique. If you type in a patient ID that already exists, the iGUIDE software will not create a new patient record (data typed in the other fields will be lost).
- **First Name**
- **Last Name**
- **Date of birth**
- **Sex** - click the corresponding check-box.
- **Comment** - type in a comment if needed. (e.g. treatment description).
  It is not mandatory to enter a comment.

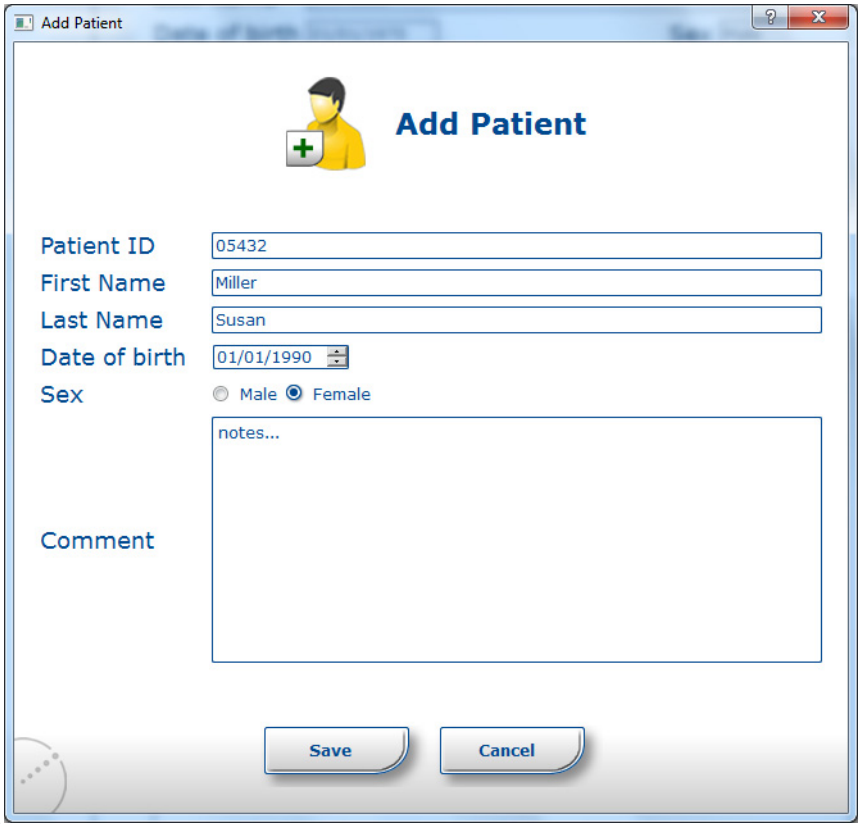

Figure 19 **Add Patient** *dialog box*

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3 Click **Save.**

The iGUIDE software creates a new patient record. The patient data is displayed in the **Patients** window.

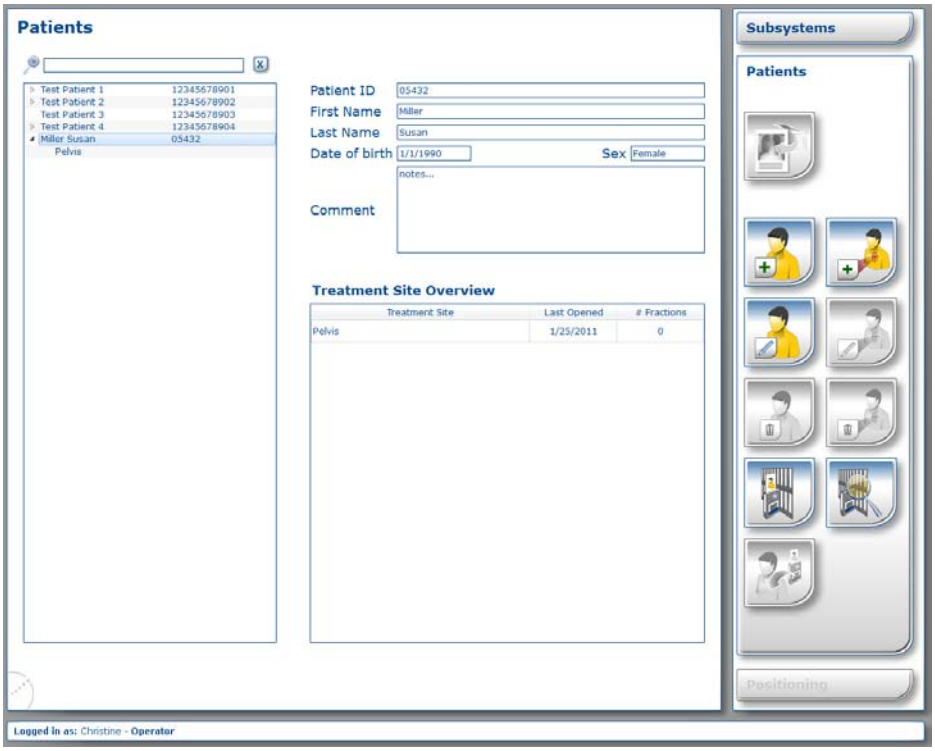

Figure 20 New patient

The **Add Treatment Site** dialog box is opened.

4 If desired you can enter the RTM values for the new patient.

Figure 21 **Add Treatment Site** *dialog box*

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5 Positioning and Treating the Patient

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5.1 About this Lesson

5.1.1 Lesson objectives

After this lesson you will be able to:

- position the patient.
- perform Relative Table Movements.
- correct the Positional Error.
- treat and monitor the patient.
- close the fraction.

5.2 The Positioning Window

To open the window click **Open Fraction for Positioning** on the right side of the **Patients** window after you have selected a patient and a treatment site.

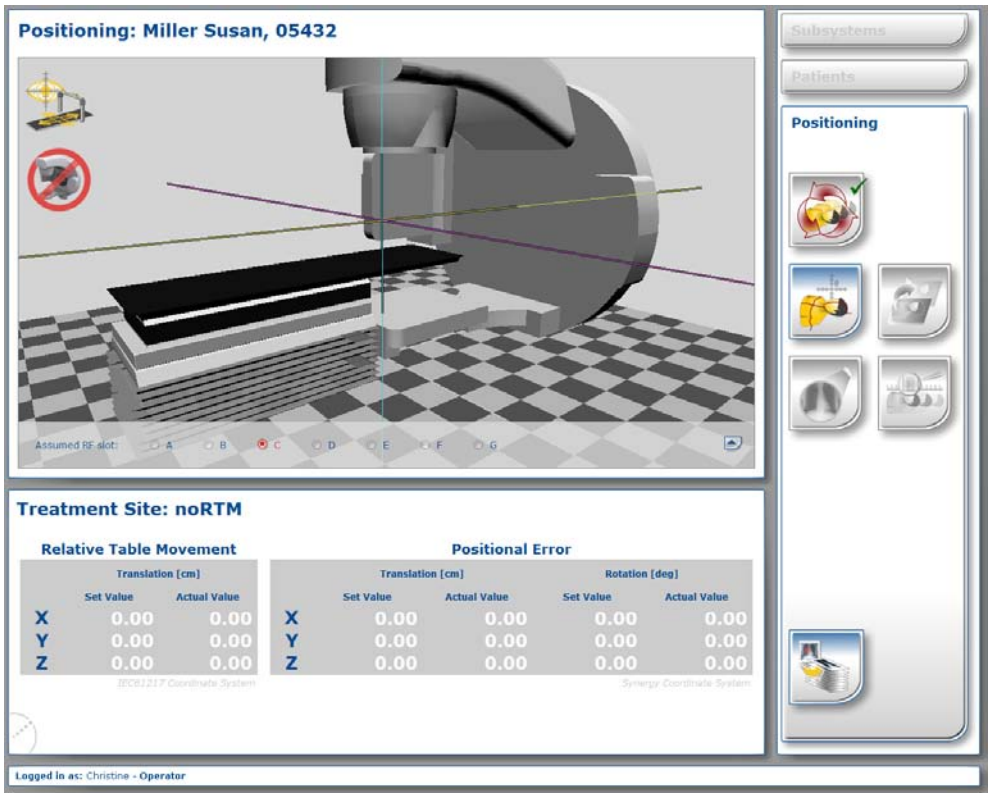

Figure 22 **Positioning** *window*

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Positioning buttons and status symbols

Table 5 The positioning buttons and status symbols

Button/Status symbol	Description
(**Restart Positioning**)	Returns to the beginning of the positioning procedure.
(Register Patient)	Registers a patient. Click this button once the relevant patient marking have been aligned to treatment room lasers.
(Relative Table Movement)	Displays the status of the Relative Table Movements.
(Imaging completed)	If enabled, it indicates that the iGUIDE software is ready to receive the Positional Error (PE) data from the external measurer. Click to enter the PE values manually.
(**Positional Error Correction)**	Displays the status of the Positional Error Correction.
(**Edit PE values**)	Edits the PE values entered manually. Only enabled when you have manually entered the PE values.
(**Abort Fraction**) or (**Close Fraction)**	Aborts the fraction before treatment has been started or close the fraction after treatment.

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5.3 Positioning the Patient

Perform the following steps for positioning the patient for daily treatment:

1 Select the patient and the treatment site in iGUIDE (refer to figure *New patient on page 38*), XVI and Desktop applications.

Note: *Confirming settings on XVI before the iGUIDE software is ready to begin imaging will break the iGUIDE workflow. As a result of this, the gantry needs to be manually moved to the acquisition start angle.*

2 The patient gets on the robotic couchtop in the **LOAD** position.

3 Open a new fraction.

4 Move the robotic couchtop to its **START** position.

When opening a fraction, the iGUIDE software prompts you automatically to move the robotic couchtop into its **START** position.

5 Align the patients external references (e.g. tattoos) for the selected treatment site with the lasers.

6 Mount the reference frame.

7 Verify the reference frame slot.

Check that the assumed position, as displayed in the **Positioning** window, corresponds to the actual position.

Figure 23 Assumed slot for reference frame indication

Note: *The iGUIDE software stores the slot selection for the next fraction.*

8 Confirm that the patient has been aligned to the lasers by clicking **Register Patient**.

WARNING

- **The HexaPOD evo RT System postions and monitors the robotic couchtop, not the patient directly. The patient must be adequately immobilized and the user must watch the patient at all times during positioning and treatment.**
- **Do not move the reference frame to another slot after the patient has been registered.**

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5.4 Performing the Relative Table Movements (RTMs)

If RTM values have been defined for the treatment site, the robotic couchtop will now have to perform the movements.

The defined RTMs appear with the current position of the robotic couchtop in relation to the registered position.

1 Move the Precise Table, if necessary as shown in the movement hints.

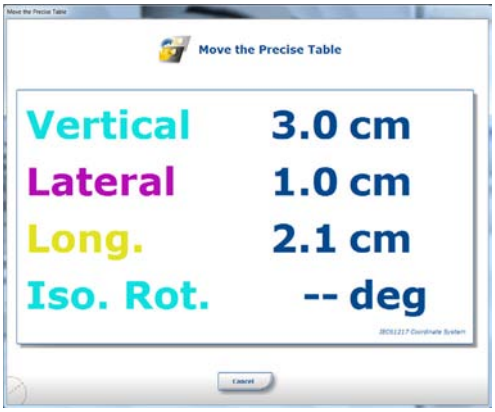

Figure 24 Manual Precise Table rotations and moves requested

When the Precise Table has reached the target position, the dialog box will close.

2 Move the robotic couchtop as shown:

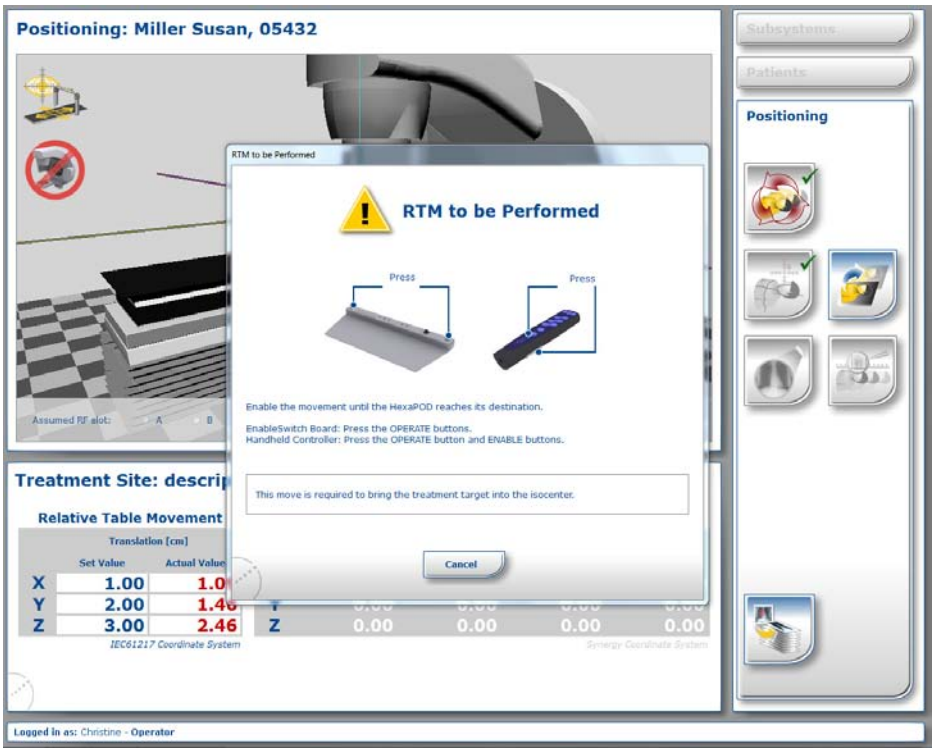

Figure 25 Performing RTMs

The RTM table shows the progression of the movements:

- The **Set Value** column displays the RTM values from the patient record.
- The **Actual Value** column displays the altering position of the robotic couchtop.

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WARNING

Make sure that RTMs are only performed once, guided either by the HexaPOD evo system or by another system such as the Desktop or MOSAIQ.

If there is no RTM or if it is successfully performed, the **RTM to be performed** dialog box is closed.

The new values are displayed green and the **Relative Table Movement** button is indicated with a green tick.

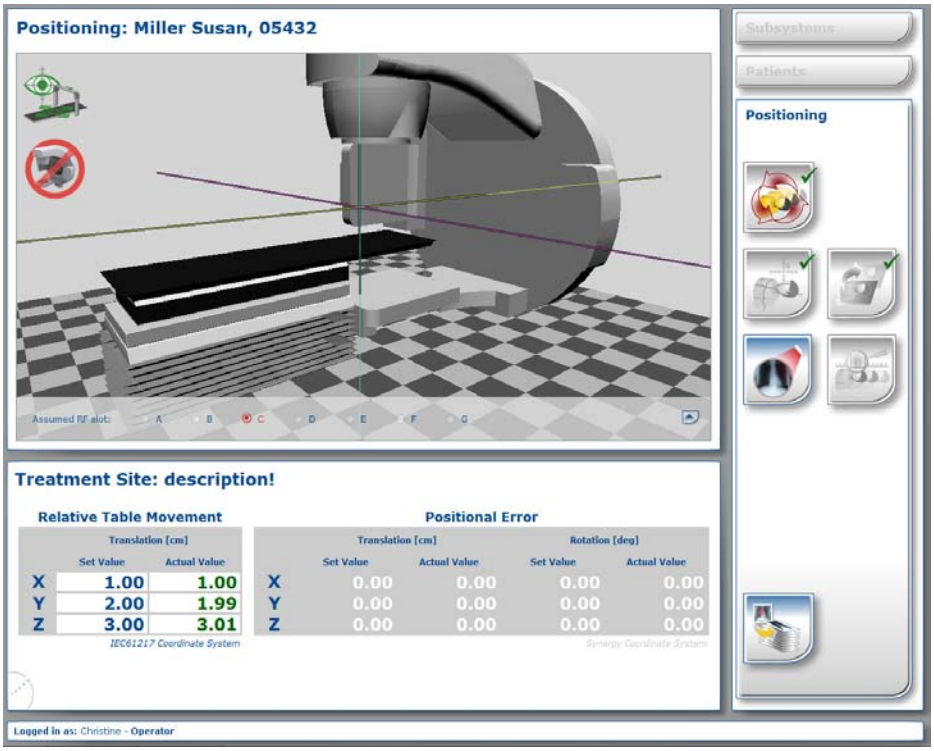

Figure 26 RTM succesfully performed

Note: *Ensure the correct collimators and filters are used in accordance with the VolumeView preset on the XVI TRM (Treatment Room Monitor) screen. Ensure there is adequate clearance between the robotic couchtop, imaging arms and Linac during rotation.*

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5.5 Correcting the Positional Error

To correct the PE you use the automatic transfer from XVI to the iGUIDE software:

Note: *For detailed information on XVI, please refer to the XVI user documentation.*

1 Before scanning the patient ensure that the correction method chosen at XVI is **HexaPOD**.

2 Confirm settings in XVI.

The following message will appear on the iGUIDE software:

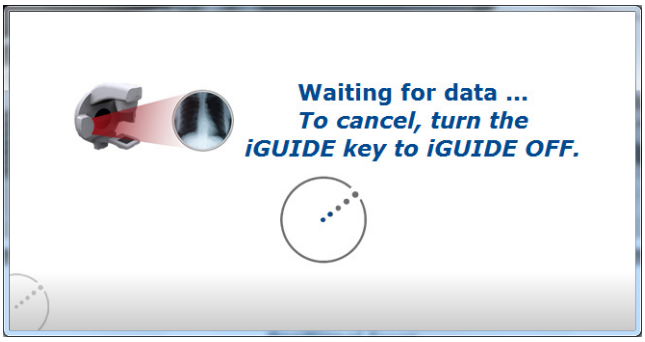

Figure 27 Waiting for Positional Error data from XVI

If this message does not appear, you will have to transfer the PE correction values manually from the XVI software to the iGUIDE software (refer to Section 5.5.1 *Manual Positional Error Transfer* on page 49).

Note: *If the user clicks* **Dismiss** *at XVI, the iGUIDE software will remain in this state. Abort the fraction by turning the iGUIDE key.*

3 Acquire a volumetric kV-image of the patient.

The XVI system reconstructs the volumetric image.

4 Register the VolumeView against the planning CT data set of the patient.

The XVI system calculates a set of PE values.

5 Convert to corrections and click **Accept** in XVI.

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The PE correction values are automatically sent to the iGUIDE software. The **Waiting for data** message will close and the **Positional Error** dialog box will appear with the received data.

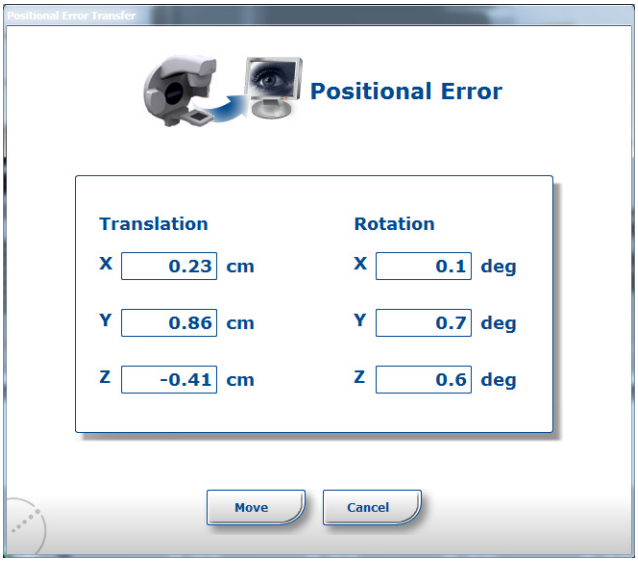

Figure 28 Positional Error values transferred

6 Confirm the PE correction by clicking the **Move** button.

If the movement is too large for the robotic couchtop to complete, the iGUIDE software will prompt you to move the Precise Table. Once this has been done or if this is not needed the robotic couchtop movement can be enabled and the values are displayed in green in the **Positioning** window.

The **Positional Error** table provides two sets of six display fields each.

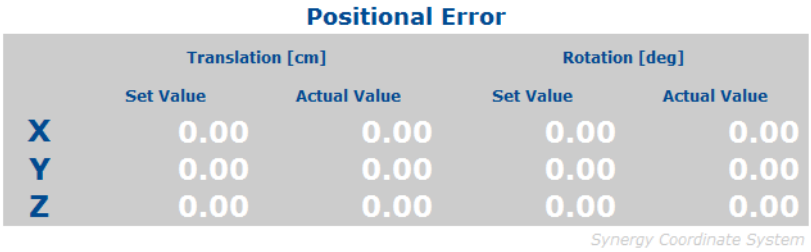

Figure 29 The **Positional Error** *table*

The **Set Value** columns show the values calculated by the XVI system.

The **Actual Value** columns show the current position of the robotic couchtop.

The colors of the values indicate the position status of the related axis, see following table.

Table 6 Indication of the PE *value colors*

Value color	Meaning
White	The kV-imaging is not yet complete and PE data not available or transferred.
Red	The position of the robotic couchtop is out of tolerance, treatments are not possible.

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Table 6 Indication of the PE *value colors*

Value color	Meaning
Yellow	The position of the robotic couchtop has been changed but the user has confirmed that the patient is in the correct position for treatment. The patient can be treated.
Green	The position of the robotic couchtop is within tolerance, the patient can be treated.

Once the robotic couchtop reaches its intended final position, the iGUIDE software releases the **EXTERNAL INHIBIT** signal.

7 It's now possible to start treatment. Continue with Section 5.6 *Verifying the iGUIDE Reference Frame Position* on page 52. The Position Guard constantly monitors the position of the robotic couchtop, see Section 5.8 *Handling the Position Guard Alert* on page 54.

Troubleshooting

Turn the iGUIDE key

The **Imaging in progress** message will close when the PE correction data has been successfully transferred. If it remains open when the XVI scan is finished, turn the **iGUIDE** key to **iGUIDE OFF**. The fraction will be closed and the iGUIDE software displays the following dialog:

Figure 30 The Aborting Fraction dialog

Before you click the desired option, you have two possibilities to turn the **iGUIDE** key:

- If you turn the **iGUIDE** key back to the **iGUIDE ON** position before clicking an option, the **Patients** window will open.
- If you leave the **iGUIDE** key at the **iGUIDE OFF** position before clicking an option, the login window will open.

Now, enter a comment and click the desired option in the **Aborting Fraction** dialog.

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5.5.1 Manual Positional Error Transfer

You may correct the Positional Error manually if you have a version before XVI R4.5, if your system is configured for manual PE correction or if problems occur at the automatic transfer from XVI.

If the automatic transfer from XVI has failed, then continue with step 3 below.

Or for manual positional error transfer complete all steps below.

1 Follow the XVI instructions to get the PE values.

2 In the **Positioning** window of the iGUIDE software click **Imaging completed**.

The **Positional Error** dialog box is displayed.

3 Enter **all six** PE values as displayed exactly on the XVI screen.

For safety reasons, you have to enter the values twice:

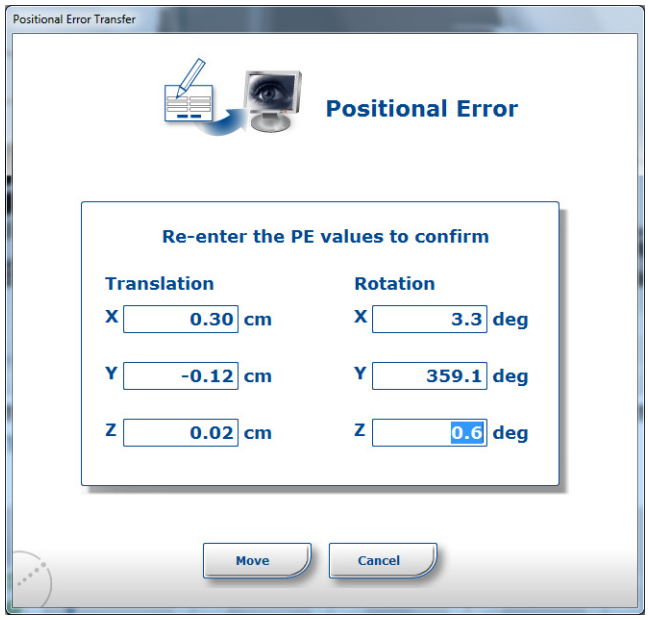

Figure 31 Manual Positional Error Transfer

4 Confirm the PE correction by clicking the **Move** button.

5 If necessary, move the Precise Table as shown in the movement hints.

6 Enable the movement of the robotic couchtop by pressing the **ENABLE** buttons on the ESB.

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The robotic couchtop will now move to the final treatment position.

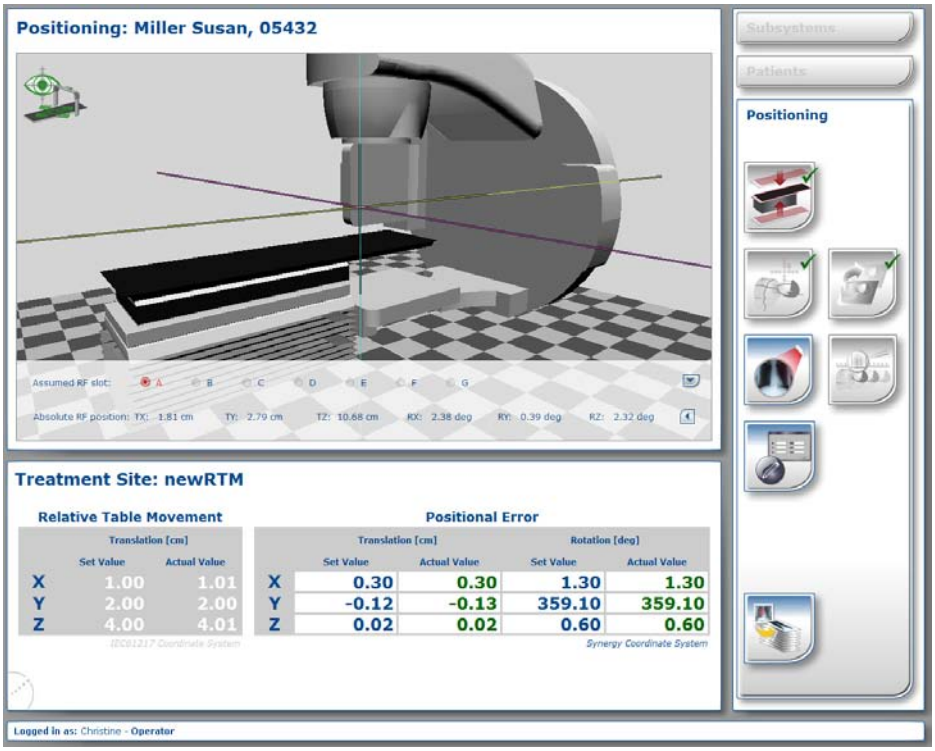
Positioning: Miller Susan, 05432
Subsystems
Patients
Positioning
Assumed RF slot:
Absolute RF position: TX: 1.81 cm TY: 2.79 cm TZ: 10.68 cm RX: 2.38 deg RY: 0.39 deg RZ: 2.32 deg
Treatment Site: newRTM
Relative Table Movement
Translation [cm]
Set Value Actual Value
X 1.00 1.01
Y 2.00 2.00
Z 4.00 4.01
IEC61217 Coordinate System
Positional Error
Translation [cm] Rotation [deg]
Set Value Actual Value Set Value Actual Value
X 0.30 0.30 1.30 1.30
Y -0.12 -0.13 359.10 359.10
Z 0.02 0.02 0.60 0.60
Synergy Coordinate System
Logged in as: Christine - Operator

Figure 32 **Positioning** *window*

Modifying the PE Values

You have two possibilities for modifying the PE values. Please regard the different results:

- Click the **Edit PE values** button to correct the entered PE values. The values will be overwritten.
- Click the **Imaging completed** button to define the treatment position in relation to the current position after a subsequent scan has been performed.

WARNING

Using the Imaging completed button will add the new values to the previous corrections. These moves will not be taken from the previous scan position.

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5.5.2 Troubleshooting

Values too high or wrong

If the transferred or entered values are too high, the iGUIDE software displays the following dialog box:

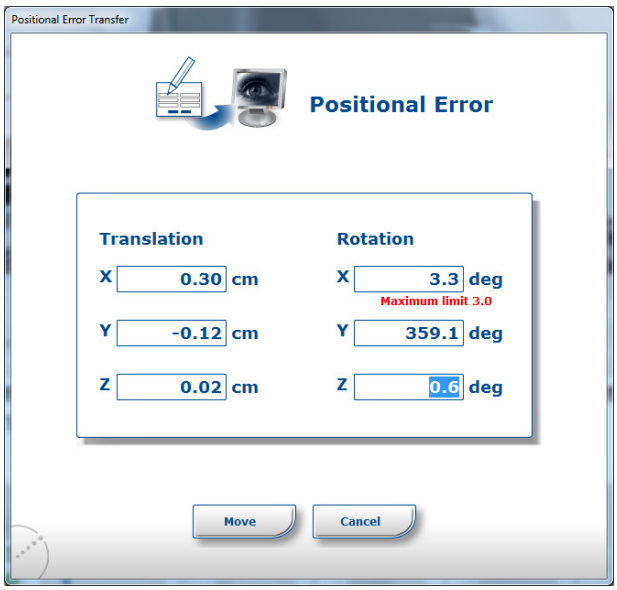

Figure 33 Too high position values

Note: *The robotic couchtop is unable to correct PE values 3.0cm/degrees or greater. It is therefore recommended that entered PE correction values equal 2.9 or less. If rotational values are greater than what the robotic couchtop can achieve, a user should change these to 2.6/2.7 degrees or reposition the patient.*

If the values of the first and second entries differs, the iGUIDE software displays the following dialog box:

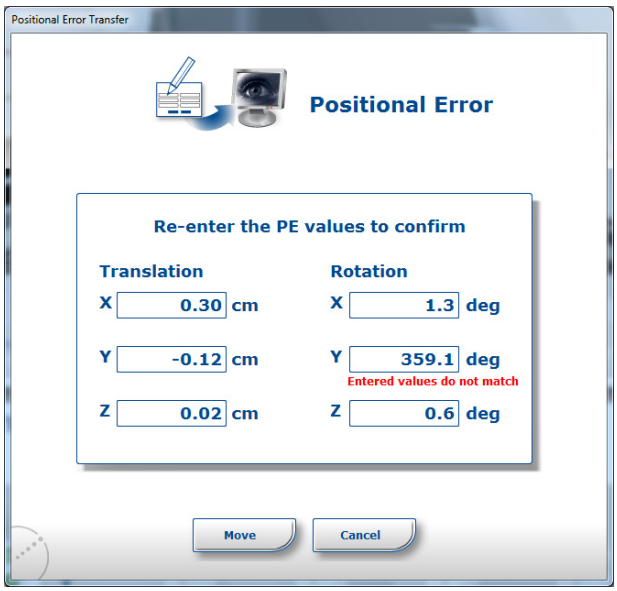

Figure 34 Wrong position values

Correct the wrong entries which are commented in red accordingly.

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Too many zeros

When you enter three values of 0 in the entry fields of any column, then the iGUIDE software displays the following dialog box as a reminder that you must enter all six correctional position values, as calculated by the XVI system.

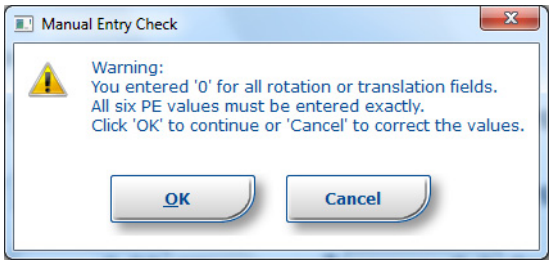
Manual Entry Check
Warning:
You entered '0' for all rotation or translation fields.
All six PE values must be entered exactly.
Click 'OK' to continue or 'Cancel' to correct the values.
OK
Cancel

Figure 35 Zeros entered as corrections position values

Ensure all six correctional position values are entered correctly and confirm with **OK**.

When all values are displayed correctly in the **Positional Error** dialog box, click **Move**.

5.6 Verifying the iGUIDE Reference Frame Position

The HexaPOD evo system monitors the position of the reference frame and not the patient's position.

When the patient is correctly positioned and immobilized on the robotic couchtop and the reference frame is installed in the same slot as in a previous treatment, the position of the reference frame should be almost identical to the position during the last fraction. The iGUIDE software allows you to view the absolute position of the reference frame. Proceed as follows:

1 Click the arrow on the right side of the slot indicator:

Figure 36 Selected reference frame slot indication

2 The absolute position of the reference frame in the room is displayed. Click the arrow on the right side of the absolute reference frame position indicator:

Figure 37 Absolute reference frame position

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The **Reference fraction** dialog box which shows the reference frame positions of former fractions is displayed.

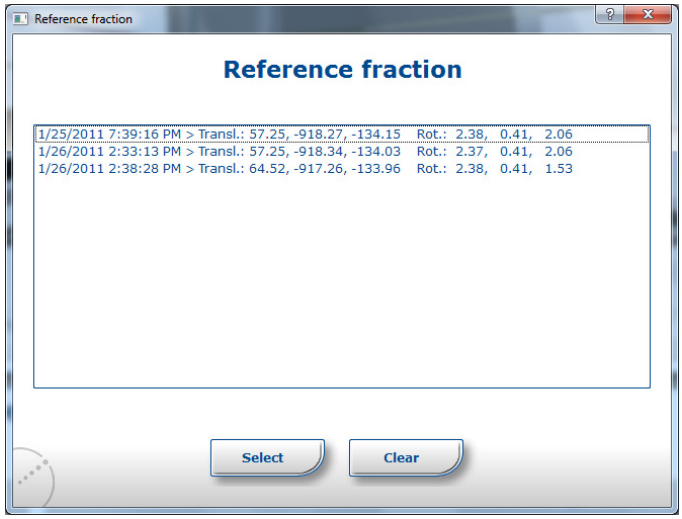

Figure 38 **Reference fraction** *dialog box*

3 If you want a reference frame position of a previous fraction, select the desired position and click **Select**.

The new (relative) reference frame position is shown as follows:

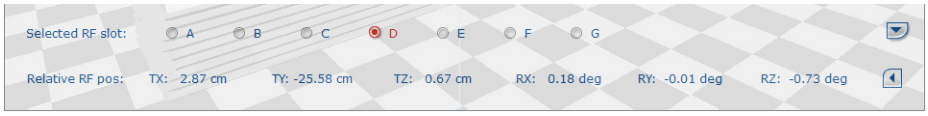

Figure 39 *Relative reference frame position*

5.7 Monitoring the Patient during Irradiation

Note: *During irradiation the iGUIDE software does not monitor the robotic couchtop position.*

The iGUIDE software waits for the **TREATMENT BEAM** signal to arrive from the Linac. When the **TREATMENT BEAM** signal is on, the following dialog box appears:

Figure 40 *Treatment in progress*

When the **TREATMENT BEAM** signal is on, the Position Guard is not active!

When the **TREATMENT BEAM** signal is off, the Position Guard is active again.

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5.8 Handling the Position Guard Alert

When a fraction is open, the Position Guard monitors the position of the robotic couchtop by means of the reference frame.

If the reference frame moves, the following dialog box appears:

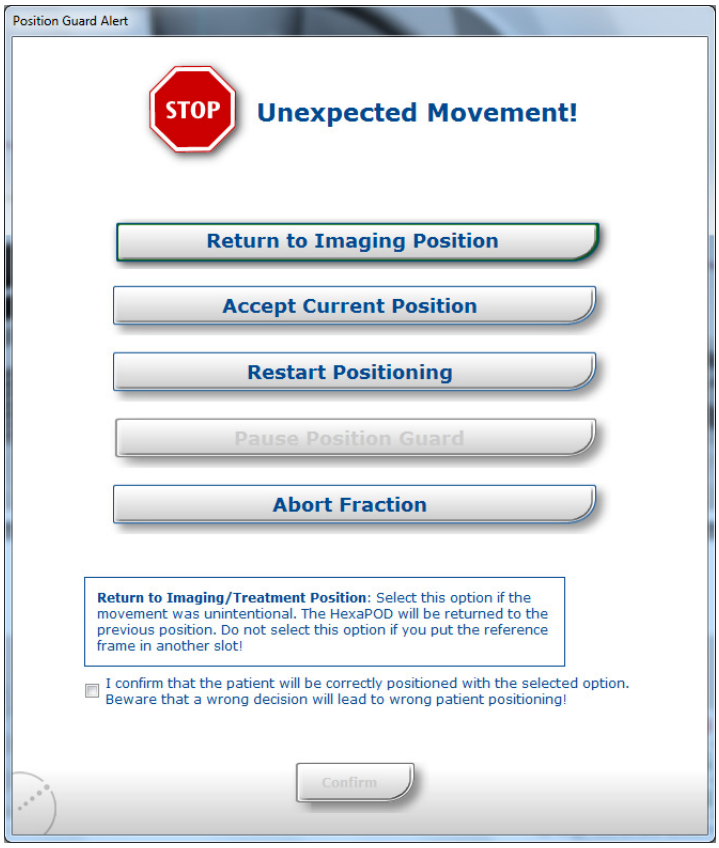
Position Guard Alert
STOP
Unexpected Movement!
Return to Imaging Position
Accept Current Position
Restart Positioning
Pause Position Guard
Abort Fraction
Return to Imaging/Treatment Position: Select this option if the movement was unintentional. The HexaPOD will be returned to the previous position. Do not select this option if you put the reference frame in another slot!
I confirm that the patient will be correctly positioned with the selected option. Beware that a wrong decision will lead to wrong patient positioning!
Confirm

Figure 41 Position Guard alert

Return to Imaging Position

Select this option if the position of the robotic couchtop or Precise Table was unintentionally moved. The robotic couchtop will be moved back to the imaging or treatment position.

Accept Current Position

The iGUIDE software will register the current position as the new guarded position.

This option is the manual override of the Position Guard. By overriding the Position Guard the user is acknowledging that the change in the position of the robotic couchtop is correct for the subsequent treatment.

Restart Positioning

Restart patient positioning from the beginning.

Abort Fraction

The fraction will be ended. The **Patients** window will open.

5.9 Closing the Fraction

Once the treatment is complete, click **Close Fraction** and follow the instructions.

The fraction will be ended. The **Patients** window will open.

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6 Reworking Patient Data

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6.4	Archiving, Restoring and Deleting a Patient Record	59

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6.1 About this Lesson

6.1.1 Lesson objectives

After this lesson you will be able to:

- display information on a treatment site.
- edit a patient record.
- archive, restore and delete a patient record.

6.2 Displaying Information on a Treatment Site

1 Select the treatment site you want to manage in the **Patients** list.

The **Fraction Event History** with the list of treatment site fractions is displayed:

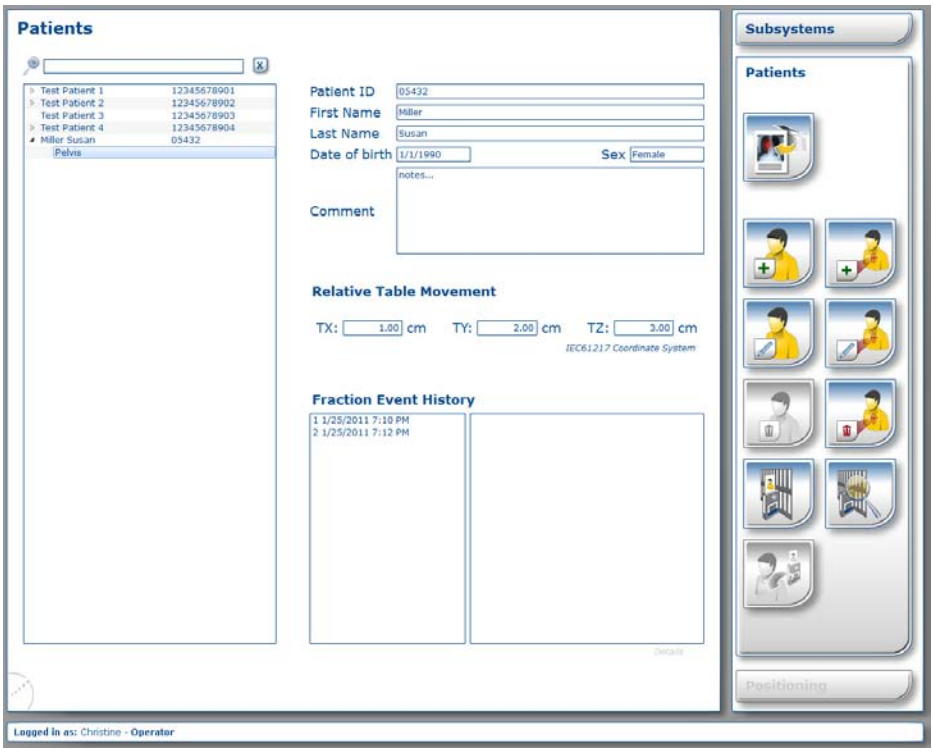

Figure 42 The **Patients** *window with selected treatment site*

2 If you want to get more information about a fraction, click on the corresponding entry in the **Fraction Event History** box.

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The iGUIDE software displays the event history of the selected fraction:

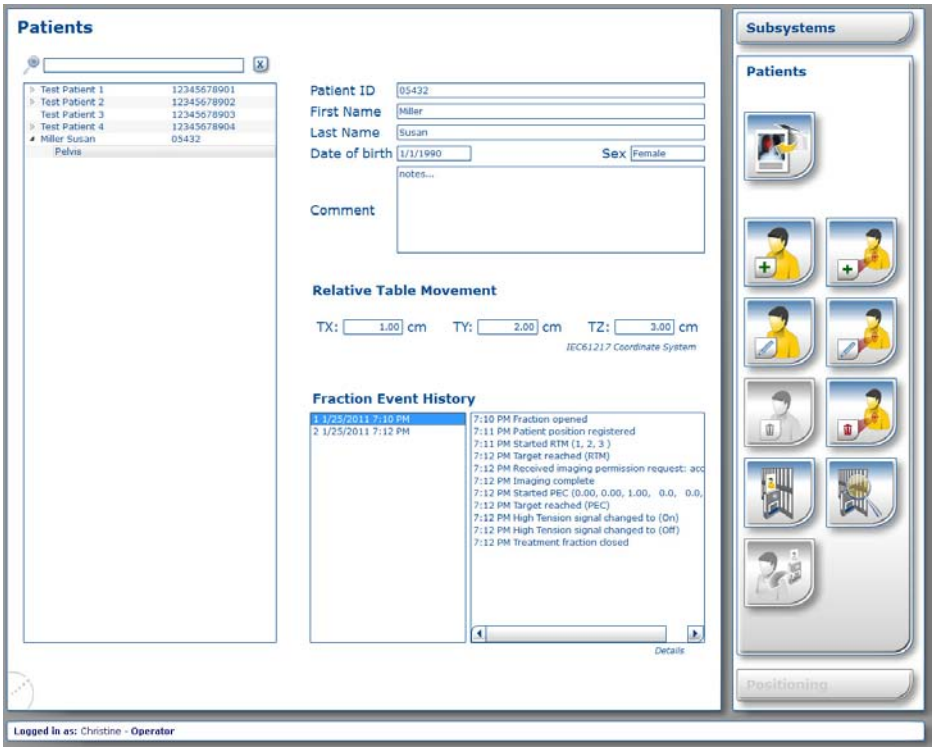

Figure 43 The **Fraction Event History**

3 If you want to get detailed information about a fraction, click on **Details** underneath the **Fraction Event History** box.

Note: *The detailed information is needed only for analysis or diagnostic.*

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6.3 Editing a Patient Record

1 In the **Patients** list, select the patient record you want to edit.

2 Click the **Edit Patient** button.

The **Edit Patient** dialog box is opened. Here you can modify the patient data.

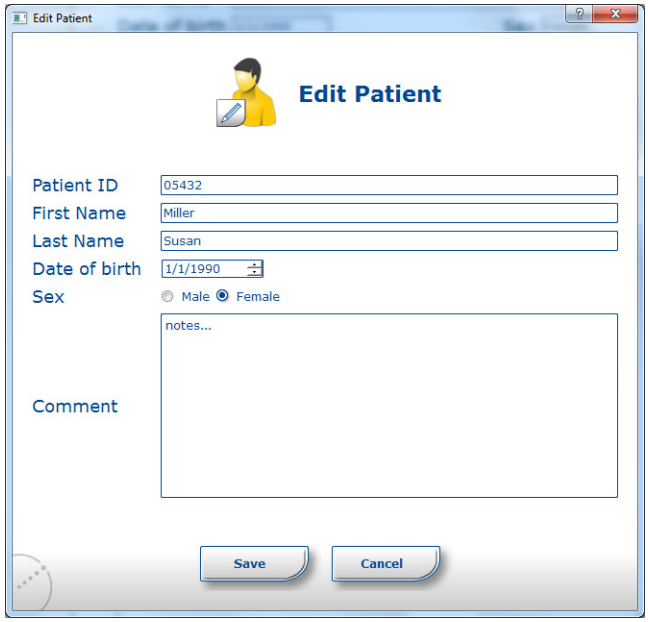

Figure 44 **Edit Patient** *dialog box*

3 Edit the data as required and then click **Save**.

The **Edit Patient** dialog is closed and the iGUIDE software displays the modified data.

6.4 Archiving, Restoring and Deleting a Patient Record

6.4.1 Archiving a Patient Record

Once a patient completes treatment, the user can archive the patient record. Archiving patient records removes the patient from the **Patients** list but keeps the record within the software.

1 In the **Patients** list, select the patient record you want to archive.

2 Click the **Archive patient** button.

3 The iGUIDE software prompts you for confirmation.

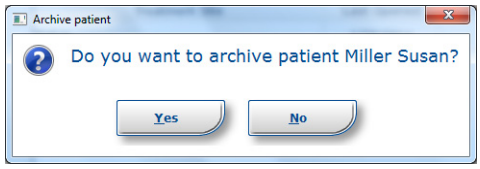

Figure 45 *Archive confirmation dialog*

Click **Yes** to archive the patient record. The patient data is moved to the archive and is no longer available in the **Patients** list.

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6.4.2 Restoring an Archived Patient Record

To restore an archived patient, you must display the archived patient list.

1 In the **Patients** window, click the **Open/Close Archive** button.

The iGUIDE software displays all patients contained in the archive.

The frame around the **Open/Close Archive** button becomes green. The **Delete patient** button and the **Restore Patient** button become accessible.

2 In the **Archived Patients** list, select the patient record you want to restore.

3 Click the **Restore Patient** button.

The patient record is restored and no longer displayed in the **Archived Patients** list. Click the **Open/Close Archive** button to show the **Patients** list with the active patient records.

6.4.3 Deleting an Archived Patient Record

Deleting a patient record means that it will be removed permanently from the database and that it cannot be restored. You can only delete patient records that have been archived. This can only be done from the archive list.

1 In the **Archived Patients** list, select the patient record you want to delete.

2 Click the **Delete Archived Patient** button.

The iGUIDE software prompts you for confirmation.

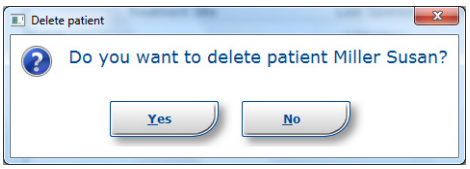

Figure 46 Delete confirmation dialog

3 Click **Yes** to delete the patient record. The iGUIDE software removes the patient from the database.

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